

REMARKS

A. Introductory Remarks

Reconsideration and allowance of this application is requested. By this Amendment, claim 1 has been amended, and claim 5 has been canceled. Therefore, claims 1-3 and 6-9 are currently pending. The rejections in the Office Action are addressed below.

B. Rejection of Claims 1-3 and 9 Under 35 U.S.C. §103(a)

Claims 1-3 and 9 have been rejected as obvious under 35 U.S.C. §103 (a) over U.S. Pub. No. 2001/0018270 ("Tsuchiya") in view of U.S. Patent No. 6,110,830 ("Skrovan"). In light of the amendment made to independent claim 1, Applicants traverse this rejection.

Applicants have amended claim 1 to recite a concentration of ozone between 1 to about 20 parts per million (ppm). Support for this limitation can be found on page 6, paragraph [0021] of the specification as filed. As acknowledged by the Examiner, Tsuchiya fails to teach or suggest any concentration of ozone in the composition, nor does Tsuchiya teach or suggest specifically using a concentration of ozone between 1 to about 20 ppm in aqueous solution.

The Office Action states that Skrovan discloses various concentrations of ozone in the polishing composition (10-20 ppm, or less than 0.01% by atomic percent, and 5-50% of ozone)¹. However, the two cited concentration ranges are for two different solutions, one of which (10-20 ppm) is a DI water rinse and the other of which (5-50%) is the polishing composition. col. 1, lines 64-67

Skrovan teaches that DI (deionized) water can comprise a small amount (10 to 20 ppm, or less than 0.01% by atomic percent) of ozone due to atmospheric ozone diffusing into the water.²

¹ Applicants note that the Office Action states that Skrovan discloses "1-20 ppm". However, this appears to be a typographical error in that the "1" should be "10". See, Skrovan col. 1, lines 64-66.

² The EPA (Environmental Protection Agency) literature (*available at*: <http://www.epa.gov/air/airtrends/weather.html>) shows that the ground level ozone in air is about 55 parts per billion (ppb). Given such a low concentration of ozone in the atmosphere at ground level, the resulting concentration in DI water would be in the range of parts per billion (ppb) based on Henry's law. Also, based on Henry's law, in order to obtain a dissolved ozone concentration range of 10-20 ppm in DI water, the partial pressure of ozone in the atmosphere would have to be in the range of approximately 33,000 ppm to 66,000 ppm. Thus, Applicants contend that unless ozone were being intentionally added to Skrovan's DI water rinse solution, it is unlikely that DI water alone would contain such a high level of ozone (10-20 ppm). Accordingly, Applicants submit that Skrovan does not teach one of skill in the art how to achieve a concentration of 10-20

See Skrovan col. 1, ll. 64-67. Skrovan teaches using this DI water strictly as a rinse solution to rinse and flush the polishing pad and the substrate layer after polishing of the aluminum-comprising layer. See Skrovan col. 1, ll. 57-62. Moreover, Skrovan teaches that the DI water containing dissolved ozone does not comprise a grit (*i.e.*, abrasive particles) so as to minimize and reduce abrasion of the aluminum-comprising layer as the DI water displaces the slurry. See Skrovan col. 1, ll. 62-65. Accordingly, one of skill in the art would not confuse this DI water rinse as a CMP composition or be led to utilize the ozone composition of the DI water rinse in a CMP composition.

Regarding the concentration of ozone in a polishing composition, Skrovan teaches the use of significantly higher concentrations, namely at least about 5% by atomic percent, (*i.e.*, 50,000 ppm). See Skrovan col. 4, ll. 6-17; col. 3, ll. 3-7. Skrovan suggests using concentrations of ozone that are orders of magnitude greater than those recited in claim 1 and, therefore, teaches away from using low concentrations of aqueous ozone, such as those recited in claim 1, in a CMP composition. Accordingly, one of skill in the art would actually be led to use significantly higher concentrations, at least 5% by atomic weight (*i.e.*, 50,000 ppm) of aqueous ozone in a CMP composition based upon the teaching of Skrovan. Thus, the modification of Tsuchiya to use a concentration of ozone of between 1 to about 20 parts per million as recited in claim 1 would not be obvious based upon the teaching of Skrovan. Accordingly, Applicants respectfully request withdrawal of the rejection of claim 1, including the rejections of claims 2, 3, and 9 that depend therefrom.³

C. The Rejection of Claim 8 Under 35 U.S.C. §103 (a)

Claim 8 has been rejected as obvious under 35 U.S.C. §103 (a) over Tsuchiya in view of Skrovan as applied to claim 1 above and further in view of U.S. Patent No. 5,738,800 ("Hosali"). Applicants traverse this rejection.

Claim 8 depends from independent claim 1. As discussed above, Tsuchiya and Skrovan fail to teach each and every limitation of amended claim 1. Hosali fails to provide any teaching regarding the use of ozone or a particular ozone concentration in a polishing composition, and

ppm of ozone in DI water, as this concentration is far greater than what would otherwise be achieved simply by diffusion of ozone from the atmosphere.

³ Applicants direct the Examiner's attention to Section D and the rejection of claim 5 for a discussion of that the reference cited in that rejection relative to claim 1 as amended.

therefore, cannot be deemed, alone or in combination with Tsuchiya or Skrovan or both, to make claim 1 obvious. On this basis and because claim 8 depends from claim 1, Applicants request the withdrawal of this rejection.

D. The Rejection of Claim 5 Under 35 U.S.C. §103 (a)

Claims 5 is rejected as obvious under 35 U.S.C. §103 (a) over Tsuchiya in view of Skrovan and further in view U.S. Patent No. 6,124,210 ("Chino"). Although claim 5 has been canceled, thereby mooted this rejection, Applicants will address Chino relative to claim 1. As an initial matter, however, the rejection of claim 5 and the characterization of Chino in the Office Action will be addressed.

In the previous Office Action, the rejection of claim 5 was based only upon the combination of Tsuchiya and Chino. Applicants' response to that rejection stated that Chino failed to teach the recited concentration of ozone. In response to that argument, the current Office Action states that Applicant's argument is not convincing because Skrovan teaches the recited concentration. Office Action, p. 5. Since Skrovan was not cited in the prior rejection and is now relied upon as teaching the recited concentration, it appears that Tsuchiya in combination with Chino only did not make the recited concentration in claim 5 obvious. Accordingly, the current rejection of claim 5 is now based upon the combination of all three of these references.⁴

As discussed above in connection with claim 1, neither Tsuchiya, alone or in combination with Skrovan, make obvious a chemical mechanical polishing composition having between 1 to about 20 parts per million ozone as recited in amended claim 1. For the same reasons as stated by Applicant in their previous response (and as impliedly acknowledged by the current Office Action based upon the need to rely upon the additional reference of Skrovan), Chino, alone or in combination with either or both of Tsuchiya or Skrovan, fails to provide any further information that can be used to conclude that this limitation is obvious. Chino is directed to a substrate surface cleaning method wherein a pre-process gas containing a very high concentration of

⁴ Interestingly, the current rejection still appears to rely upon Chino as the basis for making the recited ozone concentration obvious by stating that "it would have been obvious to select an ozone concentration in the cleaning process of Tsuchiya because Chino teaches that in the ozone treatment process, the number of the circular defects is reduced as the progress of the process time at a given ozone concentration," *see*, Office Action, p. 4. Nonetheless, Applicants will address this rejection as it applies to amended claim 1 based upon the combination of all three references. To the extent that the Office Action is simply stating that Chino would make it obvious to use *any* or *some* given concentration of ozone in Tsuchiya, such is clearly insufficient as teaching the specifically recited ozone concentration of either claim 5 or claim 1 as amended herein.

ozone (100 g/Nm^3) is directed to a substrate surface to oxidize particles on the surface. *See* Chino Abstract. Chino teaches that the “Occurrence of Circular Defect” of the silicon containing film is a function of the duration of the “O₃ process” at a fixed gaseous ozone concentration of 100 g/Nm^3 . *See* Chino col. 7, table 3. In other words, Chino teaches the application of gas containing ozone directly onto the substrate. Chino does not teach the dissolution of ozone into an aqueous chemical mechanical polishing composition. Therefore, even taken in combination with Tsuchiya and Skrovan, Chino fails to provide any additional teaching that would make the limitations of claim 1 obvious, in particular, the limitation of between 1 to about 20 parts per million ozone in the polishing composition. Moreover, there is no teaching in Chino that the use of a gas phase concentration of $100 \text{ (g/Nm}^3\text{)}$ ozone would provide between 1 to about 20 parts per million ozone in a polishing composition, even if it could be concluded that Chino teaches the application of a gas containing ozone to a chemical mechanical polishing composition.

Accordingly, the combination of Tsuchiya, Skrovan, and Chino fail to make obvious aqueous ozone concentrations wherein a concentration of ozone in said aqueous solution is between 1 to about 20 parts per million as recited in amended claim 1. Therefore, Applicants submit that amended claim 1, and all claims dependent therefrom, is allowable in light of these references.

E. The Rejection of Claims 6-7 Under 35 U.S.C. §103 (a)

Claims 6-7 have been rejected as obvious under 35 U.S.C. §103 (a) over Tsuchiya in view of Skrovan and further in view of U.S. Patent No. 6,429,133 (“Chopra”). Applicants traverse this rejection.

Claims 6 and 7 depend from independent claim 1. As discussed above, Tsuchiya and Skrovan fail to teach or suggest each and every limitation of amended claim 1. Similarly, Chopra fails to teach or suggest, alone or in combination with Tsuchiya or Skrovan or both, a concentration of ozone in an aqueous solution that is between 1 to about 20 parts per million. Therefore, Tsuchiya, Skrovan, and Chopra do not teach or suggest, alone or in combination, all of the elements of independent amended claim 1. Accordingly, on this basis alone, Applicants request withdrawal of this rejection as to dependent claims 6 and 7.

G. New Claim 10

Applicants have added new claim 10 directed specifically to spinel as the abrasive particles. Applicants note that neither Tsuchiya nor Skrovan teach the use of spinel as the abrasive particle.

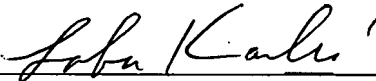
H. Request for Allowance

In view of the arguments presented above, all pending claims are now thought to be in condition for allowance, an indication of which is solicited. In the event that any issues remain outstanding, Applicants would appreciate the courtesy of a telephone call to the undersigned counsel to resolve such issues in an expeditious manner so as to place this application in condition for allowance.

No additional fees are believed due, other than the separately filed three-month extension fee. However, if any additional fees are determined to be due, the Commissioner is hereby authorized to charge these fees to the Morgan, Lewis & Bockius deposit account no. 50-0310.

Respectfully submitted,

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